

ABSTRACT

An active region 30 is formed on a substrate 3, which is made of SiC, GaN, or GaAs, for example, by alternately layering undoped layers 22 with a thickness of for example about 50 nm and n-type doped layers 23 with a thickness (for example, about 10 nm) that is thin enough that quantum effects can be achieved. Carriers spread out into the undoped layers 22 from sub-bands of the n-type doped layers 23 that occur due to quantum effects. In the undoped layers 22, which have a low concentration of impurities, the scattering of impurities is reduced, and therefore a high carrier mobility can be obtained there, and when the entire active region 30 has become depleted, a large withstand voltage value can be obtained due to the undoped layers 22 by taking advantage of the fact that there are no more carriers in the active region 30.